CLAIM AMENDMENTS

1. (currently amended) A diode-pumped laser apparatus for generating a visible power beam, the laser apparatus comprising:

a linear laser cavity having crystals and a length that does not exceed the sum of ten times the sum of the lengths of the crystals;

a plurality of reflectors that are highly reflective at a fundamental wavelength of a laser beam generated by the laser cavity, at least one of said reflectors being traversed by a pumping beam, and reflecting at said fundamental wavelength and a second harmonic wavelength with respect to said fundamental wavelength, and being highly transmissive at said second harmonic of said fundamental wavelength;

an active material with linear polarized emission and with a gain configuration with small thermal aberration for cavity mode, said active material being able to generate said laser beam at the fundamental wavelength;

a nonlinear crystal inside said cavity and able to generate a second harmonic of said fundamental wavelength by critical type I phase matching; and

thermostating means associated with the cavity for temperature locking said cavity, the reflectors, the active material, and the nonlinear crystal, the thermostating means including a mechanical structure associated with the cavity.

2. (previously presented) The apparatus claimed in claim 1 wherein said cavity and the optical elements it comprises are provided to minimize optical losses.

3. (previously presented) The apparatus claimed in claim 1 wherein optical losses at said fundamental wavelength are less than 2%.

4. (previously presented) The apparatus claimed in claim 1 wherein optical losses at said fundamental wavelength due to thermal aberration are less than 1%.

5. (previously presented) The apparatus claimed in claim 1 wherein the active material is a crystal of $Nd:GdVO_4$.

6. (previously presented) The apparatus claimed in claim 1 wherein the active material is a crystal of Nd:YLF.

7. (previously presented) The apparatus claimed in claim 1 wherein the active material is a crystal of $Nd:YVO_4$.

8. (previously presented) The apparatus claimed in claim 5 wherein the nonlinear crystal is LBO.

9. (previously presented) The apparatus claimed in claim 5 wherein the nonlinear crystal is YCOB or GdCOB.

10. (previously presented) The apparatus claimed in claim 1 wherein said visible beam is at the limit of diffraction or $TEM_{0,0}$.

11. (previously presented) The apparatus claimed in claim 1 wherein the pumping beam is absorbed in two successive passes through the active material.

12. (canceled)

13. (currently amended) The apparatus claimed in claim 1 [[2]] wherein said mechanical structure comprise a structural base and elements for supporting the optics .

14. (currently amended) The apparatus claimed in claim 13 [[2]] wherein said structural base and elements supporting the optics are made of copper or other heat conducting material and are in thermal contact with each other.

15. (currently amended) The apparatus claimed in claim 13 [[2]] wherein the temperature of the structural base is regulated by means of an active system.

16. (currently amended) The apparatus claimed in claim 1 [[2]] wherein said mechanical structure has the shape of a container [[,]] containing said cavity in sealed way.

17. (previously presented) The apparatus claimed in claim 1 wherein said thermostating means comprise an additional autonomous heat-regulating device to stabilize the temperature of the nonlinear crystal in autonomous and more precise way than the other elements of the cavity.

18. (previously presented) The apparatus claimed in claim 1 wherein the reflectors are at least in part formed by reflecting depositions on the laser crystal or on the nonlinear crystal.

19. (previously presented) A method for generating a visible laser beam in a laser cavity of the type whereby a nonlinear crystal is inserted into said laser cavity to obtain said visible laser beam through a second harmonic generation operation, the method comprising the steps of:

selecting a nonlinear crystal cut for critical type I phase matching;

aligning said nonlinear crystal at a temperature predetermined by a thermostating means associated with said cavity obtaining the phase matching condition;

optimizing the conversion into second harmonic with additional small temperature adjustments around the predetermined value.

20. (previously presented) The method claimed in claim 19 wherein the temperature regulation operation occurs in negative feedback, detecting an actual-value signal of a sensor positioned in proximity to the nonlinear crystal.

21. (previously presented) The method claimed in claim 19, further comprising the steps of:

reducing walk-off of the fundamental laser beam operating on the dimension of the cavity mode inside the nonlinear crystal, in order to contain a walk-off angle inside the divergence of the beam;

selecting the length of the nonlinear crystal as a function of the desired focusing.

22. (previously presented) The apparatus according to claim 1 wherein the active material is arranged to keep the aberration losses at less than 2%.